

**\*\*\* ABSTRACT ONLY \*\*\***

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## **Sprinkler, Vent and Draft Curtain Interaction – Experiment and Computer Simulation**

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The National Fire Protection Research Foundation is overseeing a project to evaluate the interaction of sprinklers with draft curtains and smoke/heat vents. The goal of the project is to settle the long-standing debate as to the conditions under which vents and draft curtains are beneficial, and under which they are detrimental, to the performance of a sprinkler system in large enclosures. To reach the goal, full scale commodity fires are being planned for a space that will mimic as much as possible large storage and manufacturing facilities. Towards that end, a series of heptane spray burner tests was conducted in January, 1997, at the Underwriters Laboratories large-scale fire test facility to study the interaction between sprinklers, vents and draft curtains in a well-controlled environment. One of the objectives of these tests was to evaluate the predictive capability of a field model presently under development at the National Institute of Standards and Technology (NIST). The model, which is referred to as the NIST Large Eddy Simulation (LES) fire model, is a computational fluid dynamics code that solves the equations governing the flow of smoke and hot gases from a fire. Phenomena like sprinkler sprays, flame spread and radiative transport have been incorporated in the model. The results of the experiments will be used to assess the accuracy of the model, add new physical phenomena if needed, and improve existing mechanisms if weaknesses are detected. This exercise will greatly increase the confidence in the model, allowing it to be used to expand the test matrix beyond that of the actual experiments, which are obviously limited due to cost considerations.